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Comparative Performance of Stocked Diploid and Triploid All Female Rainbow Trout in Landlocked Lakes, Southcentral Alaska, 1992

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ABSTRACT

Diploid mixed-sex and triploid all female rainbow trout *Oncorhynchus mykiss* were examined for sport fish stocking applications in Alaska. If performance of sterilized rainbow trout is adequate, stocking could be considered in open systems where interbreeding with wild stocks is a concern. Also, the potential for bypassing the rigors of spawning to produce older, larger fish could increase the public appeal of, and participation in, current stocked fisheries.

Swanson River strain rainbow trout weighing an average of 2 grams each at stocking were used for this experiment. Diploid (normal) rainbow trout and triploid (sterile) all female rainbow trout were stocked at approximately equal densities in Long (Kepler-Bradley Lakes complex, or K/B), "X", and Wishbone lakes in July 1991. Cohort survivals and mean length at age 1 were estimated and compared in September 1992. Estimated survivals for the age-1 diploid trout across the three lakes averaged 11% while average survival for the triploid all female fish was estimated at 5%, a greater than two-fold reduction. Mean lengths at age 1 for the diploid fish averaged 187 millimeters, while triploid all female trout averaged 163 millimeters, a greater than 10% reduction in growth.

KEY WORDS: Southcentral Alaska, lake stocking practices, rainbow trout, *Oncorhynchus mykiss*, diploid, triploid, all female, abundance, growth, survival.

INTRODUCTION

Stocked lakes benefit sport anglers and industries related to sport fishing by providing diverse, year-round fishing opportunities and by diverting pressure from natural stocks. In Southcentral Alaska, selected landlocked lakes have been stocked on an annual or biennial basis with hatchery-reared game fish since 1952. The majority of these lakes, ranging in size from approximately 1 to 362 surface acres, were barren or contained only threespine stickleback *Gasterosteus aculeatus* and longnose suckers *Catostomus catostomus* prior to stocking. The lakes were stocked with rainbow trout *Oncorhynchus mykiss*, Arctic grayling *Thymallus arcticus*, landlocked salmon *Oncorhynchus*, or Arctic char *Salvelinus alpinus* depending on the nature of the water to be stocked, the availability of fish for stocking, and the desires of anglers for diversified fishing opportunities.

A study designed to provide information to improve lake stocking practices was initiated in 1973. The early phase of this project concentrated on collection of detailed physical and chemical data and indexing various planktonic and invertebrate populations in stocked lakes. Since 1976, stocked game fish survival and growth has been estimated in lakes of known limnological characteristics. Accomplishments to date include but are not limited to: (1) selection of a native strain of rainbow trout from the Swanson River on the Kenai Peninsula as brood stock for Alaska's lake stocking program (Havens 1980), (2) implementation of early spawning of hatchery rainbow trout brood stock which resulted in rainbow trout fingerling plants in July when threespine stickleback densities are lowest (Havens 1985), and (3) recommendations for stocking densities of rainbow trout fingerlings (Havens and Sonnichsen 1992). In addition, experiments were performed in 1989 and 1990 comparing survival and mean length of mixed-sex triploid (sterile) and diploid (production run) rainbow trout stocked as fingerlings in a landlocked lake. Results indicated a slightly higher survival for diploid trout but no significant difference between triploid or diploid mean length through age 2 (Havens 1991).

The Alaska Department of Fish and Game Brood Stock Facility at Ft. Richardson Hatchery began producing groups of all female rainbow trout in 1991 in an effort to reduce the number of brood stock required to meet annual fingerling and subcatchable production needs. Subsequently, production of experimental lots of sterile (triploid) all female rainbow trout began. If successful, these fish could be considered for introductions into open systems where interbreeding with wild rainbow trout is a concern. In stocked landlocked lakes, rainbow trout without developed gonads might live longer and grow larger, providing a more attractive sport fishery.

This report presents first year (1992) results of a study to compare survival and growth between triploid all female (hereafter referred to as triploid) and diploid mixed sex (hereafter referred to as diploid) rainbow trout stocked in lakes. Long (Kepler-Bradley Lakes complex or K/B), Wishbone, and "X" lakes (Figure 1), stocked with rainbow trout during these investigations, contained several age classes of rainbow trout that had been stocked as fingerling in previous years (Appendix A1). All three lakes, by regulation, are hook and release lakes, have been closed to the retention of rainbow trout since 1989, and require the use of only unbaited, single-hook, artificial lures. Long Lake, located in a popular State Recreation Area, receives relatively heavy

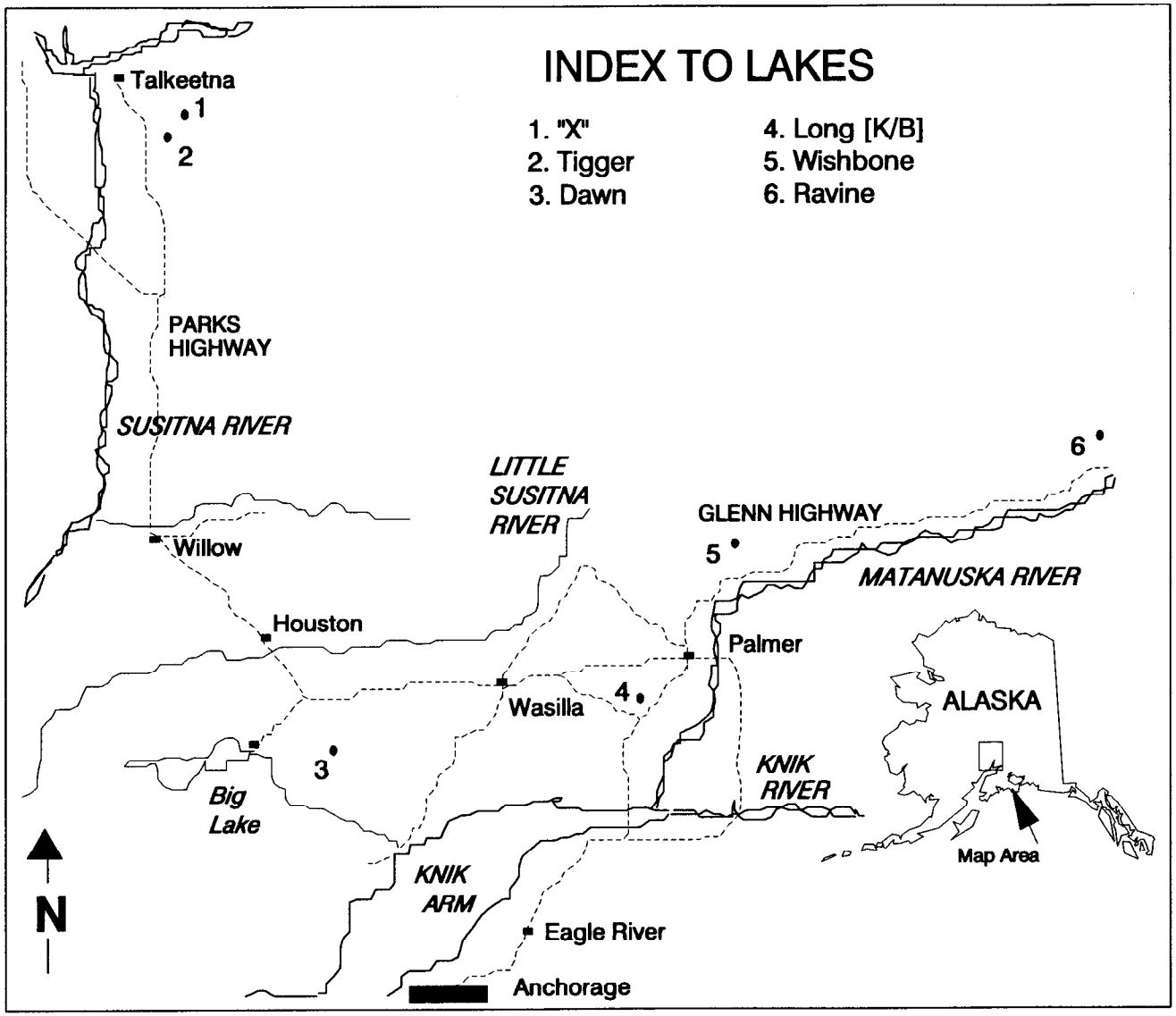

Figure 1. Location of sample lakes in Matanuska-Susitna Valley, 1991-1992.

sport fishing pressure, while "X" and Wishbone lakes are less accessible and receive substantially less fishing effort.

Results of this research will be used to begin development of stocking procedures that maximize the survival of triploid trout in the most cost-efficient manner. The specific objectives for this project were:

1. to estimate the abundance and survival rates of diploid rainbow trout and of triploid rainbow trout stocked as fingerlings in Long, Wishbone, and "X" lakes in the fall of 1991;

2. to test the null hypothesis that there is no difference in survival between age-1 triploid and diploid rainbow trout stocked in Long, Wishbone, and "X" lakes in 1991; and,

3. to test the null hypothesis that there is no difference in mean length at age 1 between triploid and diploid rainbow trout stocked in Long, Wishbone, and "X" lakes in 1991.

METHODS

This experiment had a single treatment (triploid all female rainbow trout), which was compared to a control (diploid mixed sex rainbow trout). All trout were Swanson River strain and were 1.5 g-2 g fingerlings at stocking. All rainbow trout were marked at the hatchery prior to stocking: diploid rainbow trout were given a left ventral finclip and triploid fish were marked with a right ventral finclip. In July 1991, Long, Wishbone, and "X" lakes were stocked with diploid and triploid rainbow trout fingerlings at ratios of approximately 50:50 (100 fish per surface acre for each ventral finclip for a combined plant of 200 fish per surface acre). Long, Wishbone, and "X" lakes contained no other fish with ventral finclips. In 1992, all three lakes were sampled in the spring and fall.

Capture and Handling

Rainbow trout were captured using fyke nets baited with salmon eggs, set parallel to the shoreline in randomly selected sites and directions, and checked approximately every 24 hours. The fyke nets were 2.7 m (9 ft) in length, 0.8 m (30 in) in diameter, and included two 0.9 m (3 ft) by 6.1 m (20 ft) wings (two square aluminum frames and six steel or aluminum hoops supported the entrance and body of the fyke net). Internal throats, body, and wings were 4.8 mm (3/16 in) square mesh knotless nylon.

Captured rainbow trout were placed in a tub of water oxygenated with a portable 7.5 kg (20 lb) oxygen bottle, and anesthetized with MS-222. After sampling, rainbow trout were placed in a 1.2 m (4 ft) by 1.2 m (4 ft) by 2.4 m (8 ft) covered holding pen made of plastic pipe enclosed with 4.8 mm (3/16 in) knotless nylon mesh.

Sampling and Marking

Three sampling events were conducted in each lake during 1992. In May or June, rainbow trout were captured, the presence and type of finclip (right or

left ventral) was documented, and fork length (FL) was measured to the nearest millimeter on those (age 1) rainbow trout with finclips. The possibility of multiple captures of the same fish during the event was eliminated by placing all fish into the holding pen. Upon completion of sampling all fish from all traps, they were released from the holding pen.

During a marking event in each lake in September, rainbow trout were captured, examined for finclips, and fork length was recorded and the adipose fin was removed from each fish with a ventral finclip. Presence of right ventral (RV) or left ventral (LV) finclips was again documented, then all fish were released.

During a recapture event in each lake in September or early October, all rainbow trout captured were examined for RV, LV, and adipose finclips. Fork length and type(s) of finclip(s) were recorded for each fish having a finclip. Rainbow trout with finclips were held in the holding pen until all fish from all traps were sampled.

Population Estimates

In 1992, population estimates were made for age-1 rainbow trout stocked in 1991. Marking (adipose finclipping) and recapture events were in the fall of 1992.

Chapman's modification of the Petersen estimate (Seber 1982) was used to estimate abundance ($\hat{N}$) of rainbow trout of each genetic group at time of marking:

$$\hat{N} = \frac{(M+1)\ (C+1)}{(R+1)} - 1; \qquad (1)$$

and the variance by:

$$Var(\hat{N}) = \frac{(M+1)(C+1)(M-R)(C-R)}{(R+1)^2\ (R+2)}; \qquad (2)$$

where:

M = number marked during the first event;

C = number captured and examined during the second event; and,

R = number of recaptures from the first event found in the second event.

This estimator has the following assumptions:

1. there is no recruitment or mortality between events;

2. there is no loss of mark;

3. there is no mortality due to marking or handling;

4. each fish has the same probability of capture in the first event or in the second event, or the marked fish mix completely with unmarked fish between events; and,

5. marked and unmarked fish are subject to the same rates of mortality.

The assumption cannot be made that there is no mortality, as marks and recaptures occurred three weeks apart. Therefore, the Petersen method will provide an estimate of population size at the time of marking under the assumption that mortality was equal for marked and unmarked fish in the population between events. The population of age-1 rainbow trout in these lakes is "closed" by the presence of the ventral finclip. No recruitment into the population of ventral finclipped fish occurred.

To determine if marked fish mixed with unmarked fish between events, fyke net sets were organized into six contiguous groups in each lake. Chi-square statistics were used to test the null hypothesis that the ratio of marked to unmarked fish was equal among groups of fyke net sets.

Survival (S) from stocking to fall the following year was estimated by:

$$\hat{S} = \frac{\hat{N}}{N_s} ; \qquad (3)$$

where:

$\hat{N}$ = estimated cohort abundance; and,

N_s = number stocked in 1991.

The variance of survival is:

$$Var(\hat{S}) = \frac{1}{N_s^2} Var(\hat{N}) . \qquad (4)$$

A Kruskal-Wallis nonparametric test was used to test the null hypothesis that survival was equal for diploid and triploid stocks.

Mean lengths with 95% confidence intervals were estimated using normal procedures. A two-way analysis of variance was used to test for differences in mean length of age-1 fish in September 1992 between diploids and triploids, and among lakes.

RESULTS AND DISCUSSION

Long Lake, Wishbone Lake, and "X" Lake were each sampled three times in 1992. During the May-June sampling event, a cumulative total of 228 net-nights of

effort produced a sample of 2,900 ventral finclipped rainbow trout from the three lakes. During the mark and recapture events in September-October, a total of 3,480 ventral finclipped rainbow trout were captured during a cumulative total of 299 net-nights.

1992 Spring Sampling

Rainbow Trout Catch Ratios:

In May and June 1992, 463 age-1 diploid trout and 216 triploid trout were captured in Long Lake for a diploid:triploid ratio of 68:32 (Table 1). In Wishbone Lake, 529 diploid trout and 209 triploid trout were captured for a 72:28 ratio. In "X" Lake, 1,048 diploid and 435 triploid trout were captured for a ratio of 71:29. For all three lakes, the increase in the ratio of diploid to triploid trout from stocking to spring sampling was significant (range $\chi^2 = 91.56\text{-}231.93$; df = 1; $P < 0.001$).

Rainbow Trout Length Distributions:

In May and June 1992, mean length of age-1 diploid rainbow trout in Long Lake was 112 mm while mean length of triploid trout was 98 mm (Table 2). In Wishbone Lake, mean length of age-1 diploid rainbow trout was 118 mm while mean length of triploid trout was 104 mm. In "X" Lake, mean length of age-1 diploid rainbow trout was 109 mm while mean length of triploid trout was 93 mm. For the three lakes combined, diploid fish (mean length 112 mm) were significantly larger ($F = 648.75$; df = 1, n = 2,893; $P < 0.001$) than the triploid fish (mean length 97 mm). For the two genetic types combined, there was also a significant difference in mean length ($F = 114.42$; df = 2, n = 2,893; $P < 0.001$) of ventral finclipped fish between the three lakes; however the greatest difference in mean length was 9 mm, and may have been due to differences in timing when the lakes were sampled, differences in growth rates between lakes, or both.

1992 Fall Sampling

Rainbow Trout Population Estimates:

Ventral finclipped rainbow trout were marked with an adipose clip at Long, Wishbone, and "X" lakes in September; the recapture events took place in late September or early October.

Chi-square tests of homogeneity of clip ratios among groups of fyke nets throughout each lake were not significant, indicating that fish mixed throughout each lake between the marking and recapture events (Table 3).

The length distributions of fish marked during the marking event were not significantly different from fish captured during the recapture event, except for diploid rainbow trout in Long Lake (Table 4). A plot of the length distributions of the triploid fish caught during the two events at Long Lake indicated these differences were probably due to growth of the fish and not due to size-selectivity of the gear (Figure 2). The length discrepancy between recaptures and total captures during the recapture event (event 2) occurred early in the curve and consisted of fish less than 140 mm. Many small rainbow trout from both the treatment and control groups had numerous

Table 1. Stocking, catch, and abundance ratios of age-1 diploid and triploid all female rainbow trout of Swanson River origin stocked in selected Matanuska-Susitna Valley lakes, 1991-1992.

Lake	Treatment Group	July 1991 Number Stocked	July 1991 Ratio Stocked	Spring 1992 Number Captured	Spring 1992 Capture Ratio	Fall 1992 Estimated Abundance	Fall 1992 Abundance Ratio
Long (K/B):							
	Diploid	7,277	49:51	463	68:32	849	71:29
	Triploid all female	7,451		216		349	
Wishbone:							
	Diploid	5,304	50:50	529	72:28	742	70:30
	Triploid all female	5,265		209		311	
"X":							
	Diploid	10,152	50:50	1,048	71:29	815	67:33
	Triploid all female	10,074		435		401	

Table 2. Stocking history and length data for age-1 diploid and triploid all female rainbow trout of Swanson River origin captured by fyke net in selected Matanuska-Susitna Valley lakes, 1992.

Lake	Treatment Group	Date Stocked	Number Stocked	Size (g)	Date Captured	Number Measured	Length Mean (mm)	Length SE	Length Range (mm)
Long (K/B):									
	Diploid	07/25/91	7,277	1.76	- - - -	60	55	1	46- 66
					05/15/92	463	112	1	82-149
					09/04/92	315	195	1	135-274
	Triploid all female	07/25/91	7,451	1.58	- - - -	60	54	1	44- 70
					05/15/92	216	98	1	68-137
					09/04/92	163	167	2	125-232
Wishbone:									
	Diploid	07/29/91	5,304	1.93	- - - -	50	56	1	45 -65
					06/12/92	529	118	1	80-146
					09/11/92	532	179	1	106-225
	Triploid all female	07/29/91	5,265	1.61	- - - -	50	53	1	41- 60
					06/12/92	209	104	1	74-133
					09/11/92	268	155	1	113-208
"X":									
	Diploid	07/29/91	10,152	1.77	- - - -	50	54	1	36- 65
					06/05/92	1,048	109	1	73-155
					09/18/92	670	188	1	115-263
	Triploid all female	07/29/91	10,074	1.78	- - - -	50	54	1	41- 66
					06/05/92	435	93	1	72-152
					09/18/92	364	167	1	129-223

Table 3. Comparison of mark ratios among groups of fyke nets in selected Matanuska-Susitna Valley lakes, 1992.

Lake	Total Captured	Stocking Group	df[a]	Clipped to Unclipped		
				χ^2	P	Ratio
Long	581	Diploid	5	8.34	[0.10< P <0.20]	0.248
		Triploid	5	6.73	[0.20< P <0.30]	0.153
Wishbone	353	Diploid	5	1.38	[0.80< P <0.90]	0.479
		Triploid	5	4.43	[0.30< P <0.50]	0.286
"X"	236	Diploid	5	2.32	[0.80< P <0.90]	0.369
		Triploid	5	1.47	[0.90< P <0.95]	0.500

[a] Number of fyke net groups minus 1.

Table 4. Results of Kolmogorov-Smirnov tests comparing length distributions of age-1 rainbow trout during the marking event (event 1) and recapture event (event 2) in Long (K/B), Wishbone, and "X" lakes, fall 1992.

Lake	Treatment Group	Total Captures Both Events				Total Captures Event 1, Recaptures Event 2			
		Marking Event	Recapture Event	D	P	Marking Event	Recapture Event	D	P
Long (K/B):									
	Diploid	315	389	0.144	0.001	315	144	0.169	0.006
	Triploid all female	163	191	0.131	0.081	163	89	0.232	0.003
Wishbone:									
	Diploid	532	236	0.632	0.496	532	169	0.059	0.723
	Triploid all female	268	116	0.133	0.100	268	100	0.112	0.299
"X":									
	Diploid	670	106	0.112	0.184	670	87	0.123	0.188
	Triploid all female	364	130	0.082	0.203	364	118	0.110	0.203

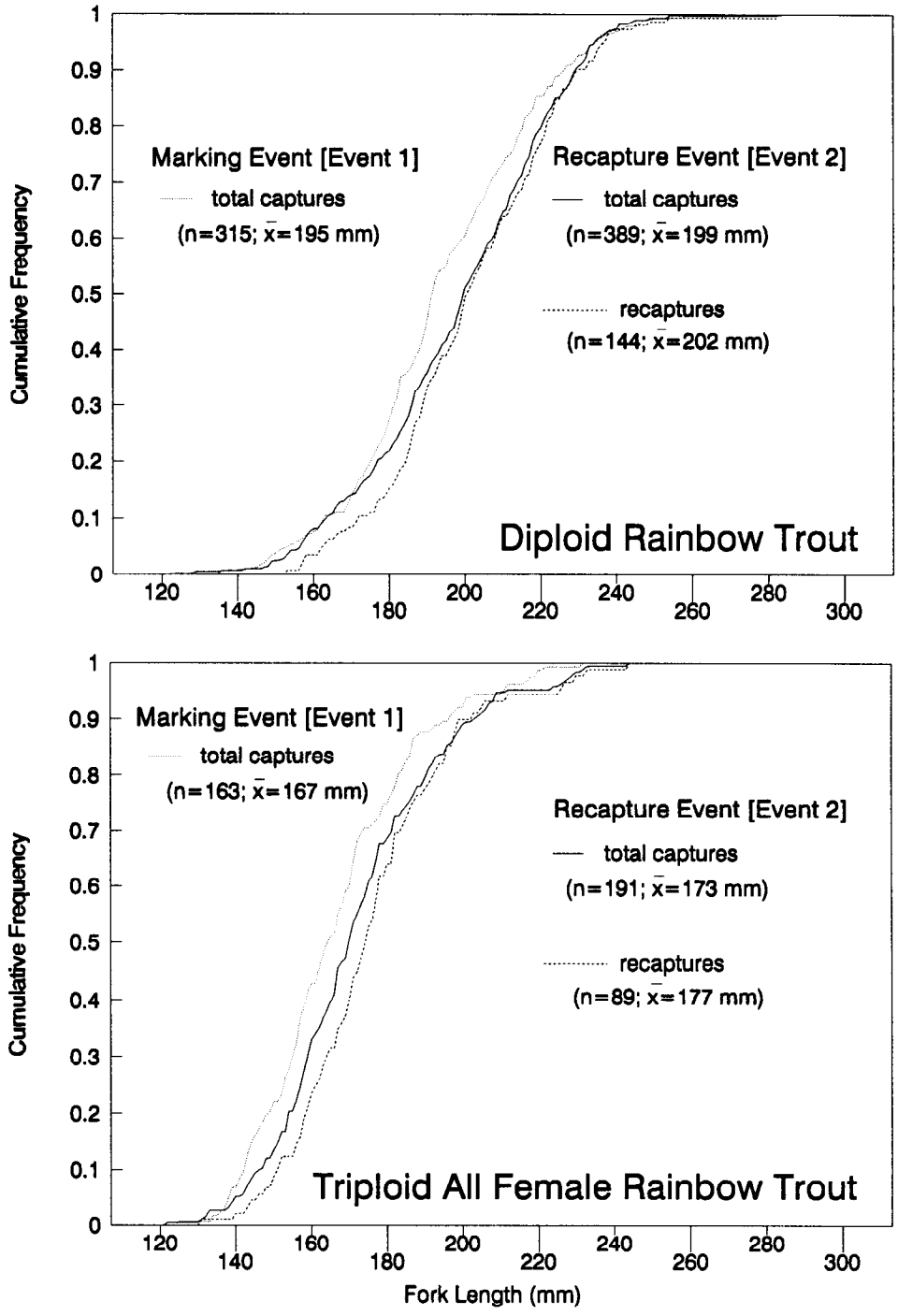

Figure 2. Cumulative length distributions of age-1 diploid and triploid all female rainbow trout during the marking event (event 1) and recapture event (event 2) in Long (K/B) Lake, fall 1992.

visible pin-head size black dots indicative of a trematode, *Neascus*, infestation (Jill Follett, Fish Pathologist, Alaska Department of Fish and Game, Anchorage, personal communication), and probably had not grown between the two events. We visually estimated that more of these small infested fish were captured during the second event than during the first event. We concluded that there was no size-selectivity of either group at any of the three lakes. Thus, an unstratified Chapman modified Petersen estimate was used to estimate the abundance of diploid and triploid rainbow trout at each lake.

Estimated abundance of age-1 fish in September 1992 was 849 diploid rainbow trout and 349 triploid fish in Long Lake for a ratio of 71:29 (Tables 1 and 5), while the fyke net capture ratio was similar at 68:32. Estimated abundance in Wishbone Lake was 742 diploid fish and 311 triploid fish for a ratio of 70:30; the fyke net capture ratio was similar at 68:32. In "X" Lake, estimated abundance was 815 diploid fish and 401 triploid fish for a ratio of 67:33; the fyke net capture ratio was similar at 65:35. The relative precision for the 95% confidence interval of these estimates ranged from 4% to 10%.

Estimated survival of diploid rainbow trout in Long Lake from stocking to September 1992 was 12%, while survival for triploid fish was 5% (Table 5 and Figure 3). In Wishbone Lake, survival of diploid rainbow trout was 14% while survival for triploid fish was 6%. In "X" Lake, survival for diploid rainbow trout was 8% while survival of triploid fish was 4%. There was a significant difference ($\chi^2 = 3.86$; df = 1; $P = 0.05$) between survival of diploid and triploid rainbow trout within all three lakes. Average survival for diploid fish was 11% while average survival for the triploid fish was 5%, a greater than two-fold reduction.

Rainbow Trout Length Distributions:

In September 1992, there was a significant difference ($F = 83.67$; df = 2, n = 2,306; $P < 0.001$) in mean length of rainbow trout among the three lakes. Mean length of age-1 diploid rainbow trout in Long Lake was 195 mm while mean length of triploid rainbow trout was 167 mm (Table 2 and Figure 4). In Wishbone Lake, mean length of age-1 diploid rainbow trout was 179 mm while mean length of triploid trout was 155 mm. In "X" Lake, mean length of age-1 diploid rainbow trout was 188 mm while mean length of triploid rainbow trout was 167 mm. As seen in the spring samples, diploid fish were significantly larger ($F = 695.35$; df = 1, n = 2,306; $P < 0.001$) than the triploid group. For the three lakes combined, mean length of the diploid rainbow trout was 187 mm, while triploid fish averaged 163 mm, a greater than 10% reduction in growth.

Computerized data files used to generate these analyses are listed in Appendix A2.

RECOMMENDATIONS

Diploid and triploid rainbow trout should be sampled in Long, Wishbone, and "X" lakes in the spring and fall of 1993. Spring sampling will provide estimates of relative abundance and mean length, and fall mark-recapture sampling will provide estimates of abundance, survival, and mean length of

Table 5. Population estimates for age-1 diploid and triploid all female rainbow trout of Swanson River origin in selected Matanuska-Susitna Valley lakes, 1992.

Lake	Treatment Group	Number Stocked	Adipose Clipped (Mark)	Recapture		Estimate				
				Total	Adipose Clipped	Abundance	95 % CI Lower	95 % CI Upper	% RP[a]	Survival
Long (K/B):										
	Diploid	7,277	315	389	144	849	770	930	9	12%
	Triploid all female	7,451	163	191	89	349	315	385	10	5%
Wishbone:										
	Diploid	5,304	532	236	169	742	694	792	7	14%
	Triploid all female	5,265	268	116	100	311	294	329	6	6%
"X":										
	Diploid	10,152	670	106	87	815	749	882	8	8%
	Triploid all female	10,074	364	130	118	401	384	420	4	4%

[a] Relative precision of 95% confidence interval.

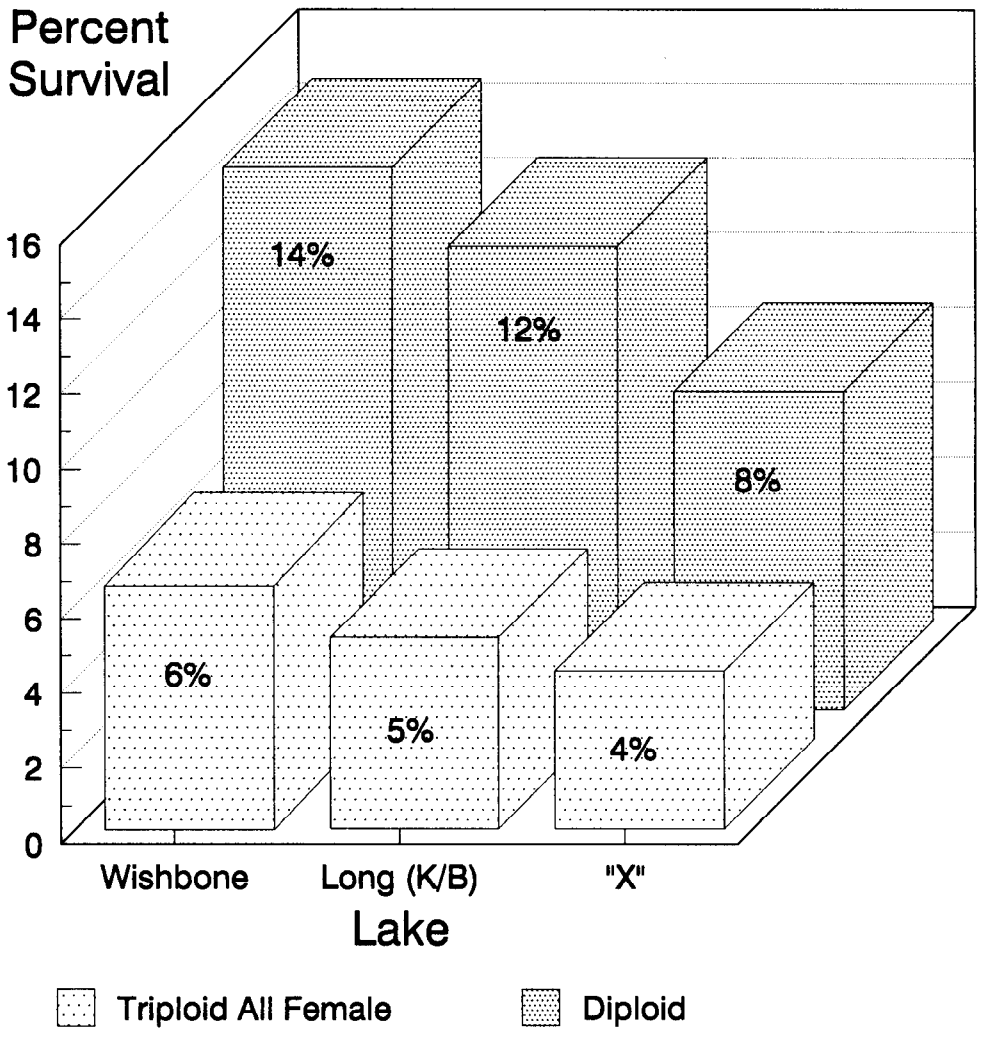

Figure 3. Diploid and triploid all female rainbow trout survival to age 1 in Wishbone, Long (K/B), and "X" lakes, September 1992.

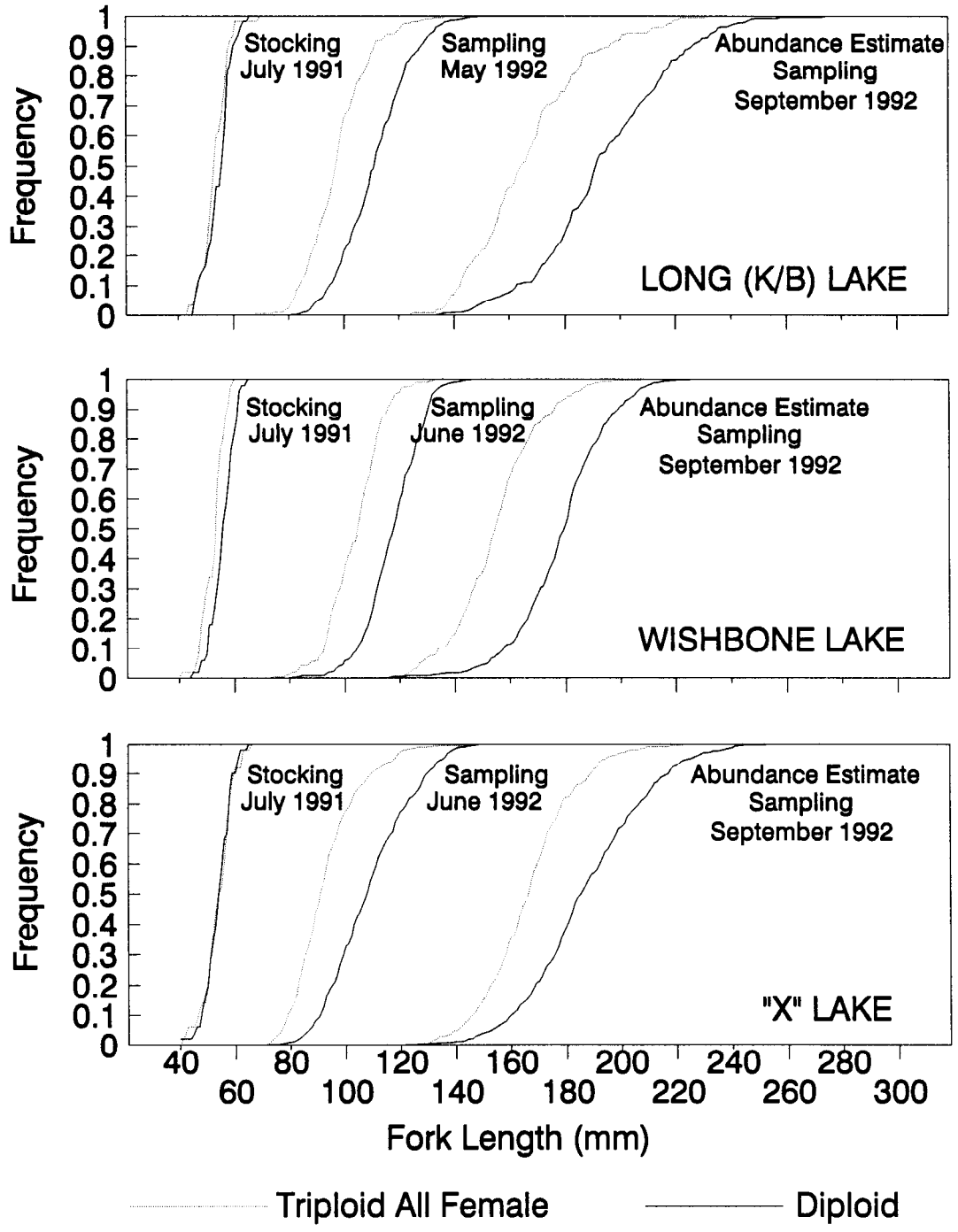

Figure 4. Cumulative length distributions of diploid and triploid all female rainbow trout at July 1991 stocking, spring 1992 sampling, and fall 1992 abundance sampling.

each treatment group at age 2. Assuming diploid mixed-sex fish were approximately equally divided between males and females at stocking, and a portion of diploid males become sexually mature and die in the spring of 1993, as is observed annually at the Ft. Richardson Brood Stock Facility (Irv Brock, Fisheries Biologist, personal communication), then abundance estimates in the fall should reflect a greater reduction in the numbers of diploid rainbow trout. Abundance and mean length of the 1991 treatment and control groups should again be estimated in the spring of 1994 when the fish will be age 3. Some fish captured should be sacrificed to determine sex ratios and to determine the percentage of triploid trout exhibiting restricted gonad development. Those fish should be measured to determine if triploid rainbow trout with restricted gonad development are significantly different in mean length from fish of the same age class exhibiting normal gonad development.

Dawn, Ravine, and Tigger lakes were each stocked in July 1992 with approximately equal numbers of diploid and triploid all female rainbow trout fingerlings to serve as replicates of the 1991 stocking experiment in Long, Wishbone, and "X" lakes. Fyke net sampling in September 1992, 2 months after the fish were stocked, indicated a significant difference in mean length between diploid and triploid all female rainbow trout in each lake (Appendix A3) and a significant difference in the numbers of diploid and triploid all female rainbow trout captured in Dawn and Tigger lakes. Samples for relative abundance and mean length should be collected in the spring of 1993 in Dawn, Ravine, and Tigger lakes, and estimates of abundance, survival, and mean length should be performed in the fall of 1993 when the fish will be age 1.

Monitoring of the diploid and triploid all female fish in the three lakes should continue as the fish reach reproductive age. If triploid all female rainbow trout are consistently out-performed by diploid fish, the degree to which reduced performance can be tolerated needs to be determined. This stock is being developed to increase angler participation, either through stocking applications that could not otherwise be considered with sexually viable fish, or development of older, larger fish that would have more appeal to anglers. The cost of this stock (at some estimated level of survival and growth) combined with the expected benefits (increased fishing effort for that level of performance) can be compared to the cost-benefit of other management options to make a rational decision.

ACKNOWLEDGEMENTS

We thank Terry Bradley, Craig Baer, Stan Walker, Bob Dieryck, and Jim Novak of the Division of Sport Fish for their concerted efforts collecting field data summarized in this report, and assuring that mark-sense forms were complete and correct. We thank Jim Hasbrouck, project biometrician, Division of Sport Fish, Research and Technical Services, for his advice through all stages of this research project and his help editing this report.

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APPENDIX A

Reference Data and Data Files

Appendix A1. Selected physical and chemical parameters of Matanuska-Susitna Valley research lakes.

Lake	Surface Area (acres)	Maximum Depth (feet)	Mean Depth (feet)	Elevation (feet)	Morphoedaphic Index Value[a]	Species Present 1991-1992[b]
Long (K/B)[c]	74.4	55	26.1	85	9.73	RT,TS
Wishbone[c]	52.7	72	35.9	1,500	1.25	RT
"X"[c]	101.4	45	17.0	375	1.88	RT,TS
Dawn[d]	11.8	17	8.1	275	3.33	RT,TS
Ravine[d]	12.3	25	11.9	1,850	20	RT
Tigger[d]	18.9	33	14.0	375	3.14	RT,TS

[a] Morphoedaphic index value (MEI), derived by dividing specific conductance by mean depth, can give a gross measure of a lake's potential productivity (Ryder 1965). This can be related to other lakes within a region that are similar in respect to climate and general nature of the ionic composition of their waters. Ravine Lake MEI is approximated at 20 when specific conductance is modified for abnormally high sodium ions.

[b] Species Codes: RT = rainbow trout,
TS = threespine stickleback.

[c] Long (K/B), Wishbone, and "X" lakes are designated catch-and-release lakes by regulation.

[d] Dawn, Ravine, and Tigger lakes, not catch-and-release lakes by regulation, were included for a comparison of physical and chemical parameters with Long (K/B), Wishbone, and "X" lakes.

Appendix A2. Data files used to produce the 1992 results for this report.

K1870RA2.DTA - Wishbone Lake fish length and catch data: spring 1992.
K1870RB2.DTA - Wishbone Lake fish length and mark data: fall 1992.
K1870RC2.DTA - Wishbone Lake fish length and recapture data: fall 1992.
K190ARA2.DTA - "X" Lake fish length and catch data: spring 1992.
K190ARB2.DTA - "X" Lake fish length and mark data: fall 1992.
K190ARC2.DTA - "X" Lake fish length and recapture data: fall 1992.
K0100RA2.DTA - Long (K/B) Lake fish length and catch data: spring 1992.
K0100RB2.DTA - Long (K/B) Lake fish length and mark data: fall 1992.
K0100RC2.DTA - Long (K/B) Lake fish length and recapture data: fall 1992.
K1710RA2.DTA - Ravine Lake fish length and catch data: fall 1992.
K2610RA2.DTA - Dawn Lake fish length and catch data: fall 1992.
K190BRA2.DTA - Tigger Lake fish length and catch data: fall 1992.

These data files are archived with Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services Unit, 333 Raspberry Road, Anchorage, Alaska 99518-1599. Contact Gail Heineman or Donna Buchholz (267-2369) for copies of the files and descriptions of the file formats.

Appendix A3. Fingerling stocking ratios and catch ratios and lengths of age-0 diploid and triploid all female rainbow trout of Swanson River origin in selected Matanuska-Susitna Valley lakes, 1992.

		July 1992		Fall 1992					
							Length		
Lake	Treatment Group	Number Stocked	Ratio Stocked	Date Captured	Number Captured	Capture Ratio	Mean (mm)	SE	Range (mm)
Dawn:									
	Diploid	1,146	50:50	09/25/92	189	59:41	97	1	68-137
	Triploid all female	1,147		09/25/92	134		88	1	66-112
Ravine:									
	Diploid	1,202	50:50	09/25/92	110	52:48	100	1	70-116
	Triploid all female	1,189		09/25/92	103		91	1	66-110
Tigger:									
	Diploid	1,881	50:50	09/29/92	111	77:23	86	1	67-107
	Triploid all female	1,868		09/29/92	33		79	1	65- 93